

3.3 Reading Guide

How do Pollutants for During Combustion?



Anticipation Guide: Pollutants & how they get into air.

Directions: 1. Carefully read the statements below. Think about each statement. Decide if you think it is true or false. Mark an X on the line for your answer. After reading pages 133 -135 go back and verify you answers by marking the statements true or false and correct the false statements by making them true.

Before You Read		After You Read
True False	Statements	True False
	Cars, trucks and airplanes do not produce pollution.	
	Combustion is not a major cause of pollution in most communities.	
	Automobiles use internal combustion engines to burn fuel.	
	Atoms do not form bonds with other atoms to create molecules.	
	Product of combustion (NO, NO ₂ , CO ₂ , and H ₂ O) past through a vehicle's exhaust system into the atmosphere.	
	CO ₂ and H ₂ O are not pollutants but contribute to global climate change.	



Read page 133 and answer the following questions.

1. Where does the majority of the pollution come from in Los Angeles?
2. Give 3 examples of where the pollutants come from.



Observe

* Cars use internal combustion engine to burn fuel. It takes place inside cylinders, which is in a small space. This confined space creates heat and pressure, which build up in the cylinders.

* Watch a video on combustion in a car engine and notice how the pistons move up and down.



Stop and Think

1. What is the fuel in an internal-combustion engine?
2. Where does combustion happen in an internal-combustion engine?
3. Why is there so much heat and pressure in the cylinder of an internal-combustion engine?
4. What substances **go into** an internal-combustion engine? What substances are **produced** by an internal-combustion engine?

Chemical Reactions in an Internal Combustion Engine (Read page 134-135)

Main Idea	Details
Product of combustion are.... Pollutants and climate change...	
Molecular bonds...	
Stable molecules...	
Unstable molecules are...	
Reactive Molecules are...	
Nitrogen molecules and Oxygen molecules are...	
Heat and pressure ...	
Change of nitrogen molecules and oxygen molecules	

Using Chemical Equations

Directions: 1. Carefully read the statements below. Read pages 136-137. As you are reading think about each statement and determine if you generally agree or disagree with it by marking and X next to your answer. **Be sure to provide an explanation for your response by writing it next to the "Why?"**

1. Scientists do not use chemical equations as a short notation for describing chemical reactions.

Agree _____ Disagree _____ Why?

2. An arrow is used to show reactants have changed into products.

Agree _____ Disagree _____ Why?

3. Reactants are substances that don't enter into a chemical reaction.

Agree _____ Disagree _____ Why?

4. Products are what is formed.

Agree _____ Disagree _____ Why?

5. Plus signs (+) are used to separate reactants from other reactants and products from other products.

Agree _____ Disagree _____ Why?

6. The small numbers written down and to the right of the chemical symbol is called a subscript.

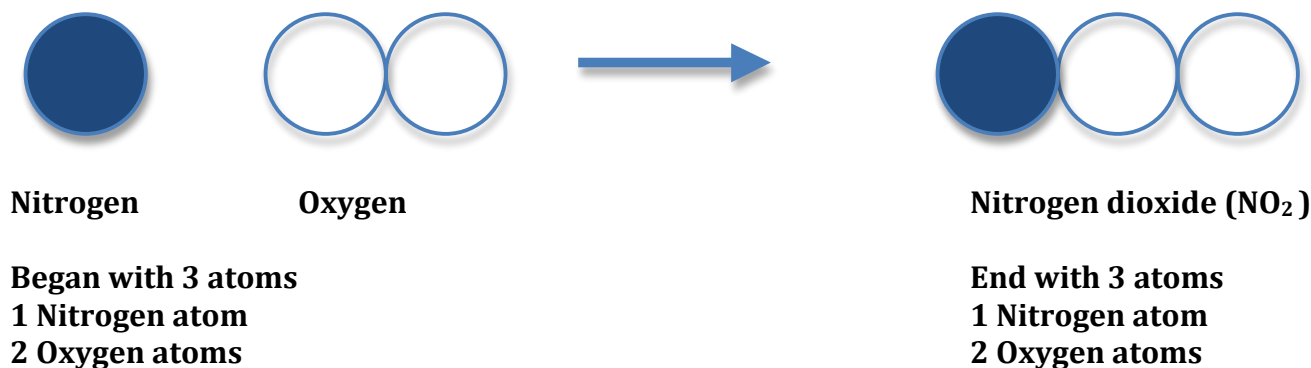
Agree _____ Disagree _____ Why?

7. Superscripts show how many atoms of the element are present in each molecule.

Agree _____ Disagree _____ Why?

8. The law of conservation of matter is when matter is either created or destroyed.

Agree _____ Disagree _____ Why?

Practice:**Stop and Think**

1. What is the advantage of using chemical equations?
2. How does the law of conservation of matter relate to chemical equations?

Reflect

1. Suppose you place a lighted candle on a balance. If you assume that the law of conservation of matter is accurate, how do you account for the decrease in mass as the candle burns? Where does the mass go?
2. Now suppose you put the same lighted candle inside a closed jar. If you assume that the law of conservation of matter is accurate, how do you account for the mass remaining the same as the candle burns?
3. Think about how the two experiments above can be compared to an internal-combustion engine. If the internal-combustion engine were in an enclosed container, you would be able to measure the mass of the products, and you would find the mass of the products to be the same as the mass of the reactants. But an internal-combustion engine is not a closed system. A closed system is one in which substances from the environment do not enter the system, and substances from the system do not leave to enter the environment.

What do you think happens to the products of internal combustion?

Where do they go?

Which of the above experiments is more like an internal-combustion engine?